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Designs for the Digital Workplace

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Abstract

In this paper, we present the findings of a study to identify digital workplace designs through an analysis of 13 Enterprise Collaboration Systems (ECS) using organizations. Our findings reveal six distinctive workplace designs. Three *people-focused* designs supporting different levels of sophistication of interaction between people working together to create and share information, and three *process-focused* designs supporting joint work towards business improvement projects and integration with business processes and with other enterprise systems. The findings show how the digital workplace is being interpreted differently and being shaped by organizations to meet specific organizational requirements.

Keywords: digital workplace designs; digital transformation; use cases; enterprise collaboration systems; enterprise social software

1. Introduction

Over the past forty years organizations have experienced numerous waves of IT-enabled change that have transformed the ways that work is supported and organized [1–3]. Driven by wider social and economic concerns

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regarding new technologies [4,5] and predictions about the changing nature of work [6,7], the current wave of IT-enabled change is focusing organizations' attention on the processes of digital transformation [8] and the design of the digital workplace [9,10]. However, whilst much has been written about this latest wave of transformation, especially in the practitioner literature, the effective design of the digital workplace remains a significant challenge [9]. In this paper, we present the findings of a study to investigate emerging designs for the digital workplace (DWP). The paper is organized as follows. We begin with an examination of the elements and characteristics of current definitions of the DWP. The paper then focuses on Enterprise Collaboration Systems (ECS), which are identified as a central platform for the digital workplace. We present the preliminary findings of a study to identify emerging digital workplace designs. The study reveals six distinctive digital workplace designs representing different interpretations of the digital workplace. The paper concludes with the implications of these findings for future work.

2. Defining the digital workplace

The concept of the digital workplace is not new, the first use of the term "digital workplace" is attributed to Jeffrey Bier in the late-1990s [9], however it originates in earlier research on the topics of work-oriented technology design [11–13] and the design of groupware and virtual workplaces [11,14,15] In recent years, in response to rapid developments in Enterprise 2.0 and social software [16] and as part of wider concerns surrounding the future of work and organizations [6,7], the term digital workplace has gained renewed attention as the technical infrastructure, hardware and software are now available to realistically support these earlier visions of the DWP.

2.1. Characteristics of the digital workplace

As noted by Köffer [9], the DWP is a significant theme for organizations and practitioners, however it has received limited attention in academic research. There are many definitions of the digital workplace, most of which are rather general and aspirational. For example, Deloitte [17] define the DWP as encompassing "all the technologies people use to get work done in today's workplace – both the ones in operation and the ones yet to be implemented" and Robertson [18] presents it as a "holistic set of tools, platforms and environments for work, delivered in a coherent, usable and productive way". In order to bring some coherence to our work and to enable us to examine the DWP in more depth, we analyzed these emerging definitions of the DWP to understand how it is currently being characterized. Through a review of the literature we identified eight definitions being used by practitioners and analyzed them following a process of content analysis and thematic coding [19]. In the first coding cycle, we identified the elements included in each definition and discovered 15 broad characteristics grouped into three thematic categories: i) organizational strategy and design, ii) people and work and iii) technology platform. A summary of the characteristics of the DWP definitions is provided in Table 1 and the three thematic categories are discussed below.

Organizational DWP strategy and design. The DWP is seen as part of a coordinated organizational strategy to change corporate culture and to create a new kind of workplace [20]. The strategy must be designed in a way that it provides both a framework for the design as well as suitable conditions for the development of a digital technology platform to support collaborative and flexible work [21]. The strategy should be future-oriented [17] and adaptive [20], evolving alongside new developments in technology [22]. The DWP should be planned and managed coherently [23] and compliant with relevant laws and regulations [24] such as employment laws and laws relating to the use and storage of data and information.

People and work. A key strand in all definitions is a focus on people and work. The DWP should provide the conditions to enable people to be productive in their work [18,23,25] and predictive and intelligent "so that it is able to anticipate the requirements of the user for data, information and knowledge" [24]. Specific emphasis is given to supporting information/knowledge work [24], employee engagement, collaboration and information sharing [21,24].

Technology platform. Current definitions of the DWP focus heavily on the underlying technologies, characterizing them as an integrated platform that provides all the tools and functionality required to support people and their work practices [18,24]. This core platform must also be capable of being integrated with other business information systems and services [18,21] and be location-independent [21]; enabling flexible and integrated working. The core technology platform is frequently seen as the successor to the corporate intranet [24] drawing on the functionality and capabilities of social software and utilizing "consumer-oriented styles and technologies" [25].

Thematic category	Characteristics	Literature examples
Organizational strategy and design	Provides a coordinated strategy for DWP	[20], [21]
	Designs are planned and managed	[18], [23]
	Designs specific to corporate culture needs	[20], [21]
	Strategy is agile, evolving and future-oriented	[17], [20]
	Compliant with e.g. workplace and information laws	[24]
People and work	Supports information and knowledge work	[21], [24]
	Contains all tools required for employees to be productive	[17], [18], [21], [23]
	Supports employee engagement, collaboration & information sharing	[18], [21], [24]
	Predictive and intelligent support of work practices	[24]
Technology platform	Internally integrated platform: holistic set of tools	[17], [18], [21], [25]
	Externally integrated platform: integrated with other business systems	[21]
	Coherent and usable	[23], [24]
	Supports consumer-oriented styles and technologies	[25]
	Adaptive and tailorable to users' needs	[18], [21]
	Location independent	[21], [24]

Table 1: Characteristics of the digital workplace (results of content analysis of published definitions)

Thus, in summary, the DWP is being conceived as: an integrated technology platform that provides all the tools and services to enable employees to effectively undertake their work, both alone and with others, regardless of location and is strategically coordinated and managed through DWP designs that are agile and capable of being adapted to meet future organizational requirements and technologies.

Whilst these definitions provide an idea of the vision for a digital workplace they provide few insights into the structure and nature of the required integrated technology platform or about different strategic designs for the digital workplace. In the remainder of this paper, we present a study to examine emerging designs for the digital workplace. The study is part of a long-term research program to examine the processes of digital transformation and the development of digital workplace platforms [33]. The research program (IndustryConnect) is organized around a practice-based research community comprising a team of researchers from a German University and practitioners from 29 German companies who are pioneers in the development of the digital workplace within their organizations. Through a series of in-depth, longitudinal organizational case studies, surveys and research workshops, the research team have been following and documenting the sociotechnical change associated with the development of the DWP through the introduction and use of enterprise collaboration systems (ECS) in these 29 organizations [33].

3. Enterprise Collaboration Systems: the integrated platform for the Digital Workplace

All the definitions analyzed above, identified integrated platforms as a core component of the DWP. The remainder of this paper focuses specifically on Enterprise Collaboration Systems (ECS), which are characterized as the de facto digital workplace platform. ECS are large-scale integrated platforms that provide tools for collaboration and communication between employees, support knowledge and information sharing and document management and coordination of work and group activities. The notion of providing technology to enable employees to collaborate and communicate regardless of physical or temporal location is not new; the field of CSCW has for over 25 years focused on exactly this, what distinguishes these new collaboration systems is their scale and functional scope. ECS extend the groupware and workflow management functionality of earlier collaboration technologies (e.g. email, shared calendars, task management) with Enterprise Social Software (ESS) functionality (e.g. social profiles, wikis, blogs, forums, collaborative tagging, event scheduling and coordination) [26,27]. All organizations in the IndustryConnect research community use IBM Connections; currently the largest, most integrated example of an ECS.

ECS comprise three levels of structure: platform, community and content. At the *platform level* of an ECS the focus is on the whole of the organization. An ECS platform typically supports the work of many thousands of different users throughout the organization as well as authorized users from outside the organization such as business and project

partners, subcontractors etc. The platform spans different functional areas, supports different job types and work practices, is location-independent and available through different devices (e.g. desktop/laptop computers and smart mobile devices). Users can form communities on the platform, ranging in size from one member to many thousands of members. Over time, the ECS platform is filled with many hundreds, even thousands of communities. At the *community level* of an ECS the focus is on the design of a single community, which can be created to support a wide range of different use cases [28]. At the content level of an ECS the focus is on the artifacts and documents being created, manipulated and stored in the ECS [29] and being used to support digital work practices. ECS are, in essence, a new form of information infrastructure. Monteiro et al. ([30], p576) identify information infrastructures as: i) open to number and types of user, ii) interconnections of numerous modules/systems, iii) shaped by an installed base of existing systems and practices and iv) typically stretched over space and time. Below we apply these four characteristics to ECS as a means of explaining their role as information infrastructures for the DWP.

Openness to number and types of user. ECS are not designed with a typical user in mind but are open to any number of users from different organizational and functional areas.

Interconnection of numerous modules and systems. ECS comprise a wide range of built-in modules and functions that are integrated with each other and have federated services such as system-wide search and user management. ECS can also be integrated with other business systems to connect the ECS with more traditional process-based systems (e.g. ERP and CRM systems [31]).

Shaped by an installed base of existing systems and practices. ECS are platforms that support a wide range of functions that enable different types of communities or workspaces to be formed. A key strength and quality of ECS is their flexibility and malleability; they are not fixed or pre-defined but can be shaped and designed through use [32] to meet current and future work practice needs and requirements.

Typically stretched over space and time and used across many locales and enduring over long periods of time. ECS communities can be formal or informal, they can range from those designed to support long-term collaboration and knowledge management over many years to those intended for organizing a one-off event such as a conference or meeting with a limited life expectation of weeks or months.

Thus, ECS are large-scale, integrated platforms that are being designed and shaped through use to meet organizations' specific digital workplace needs and requirements. In order to understand how ECS are enabling organizations to achieve digital workplace transformation requires deeper, in-depth and longitudinal studies of the implementation and use of ECS over time; this is the focus of the IndustryConnect research program. In the following sections, we introduce a study to identify the ways ECS are being used to develop and support different DWP designs.

4. Identification of designs for the digital workplace

Research objectives. As described above, the objective of our research is to examine patterns in the current use of integrated Enterprise Collaboration Systems (ECS) in our IndustryConnect case companies and identify typical emergent *workplace designs*. Our research questions were: (1) "What are the main objectives for the introduction of an integrated ECS?", (2) "What is the current state of ECS adoption?" and (3) "Which typical patterns of ECS can be identified (workplace designs)?".

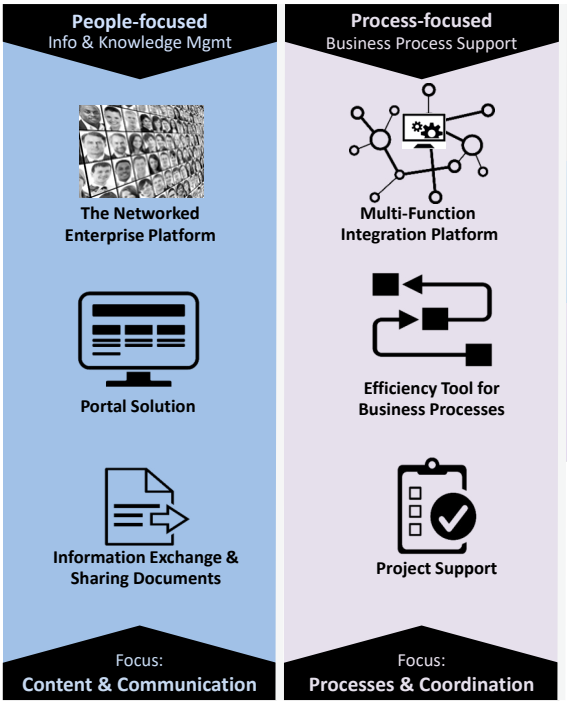
In a previous phase of our research program, we identified ECS Use Cases and developed the IRESS Model [28]. The IRESS Model provides a list of ECS Use Cases and was developed from the literature, case study interviews and in research workshops with the IndustryConnect practitioners [33]. The Use Cases were refined and evaluated through an online questionnaire in which the existing Use Cases of our case companies were collected and categorized.

Methods and data collection. Empirical data in the form of in-depth case studies, interviews and research workshops was collected from 13 of the ECS using organizations. The case companies (all members of the IndustryConnect) had launched their ECS projects between 4 and 8 years ago. We conducted on-site interviews with collaboration professionals and other key informants. All interviews were recorded and the material was used to write in-depth base cases using the eXperience Method for writing case studies [34]. The case studies were analyzed (see next section) and six workplace designs were identified and visualized (Figure 1). These designs were then presented and discussed at a research workshop with collaboration professionals from the participating organizations. The workshop members located their current DWP design by placing their company logo on a poster printout of Figure 1.

All company representatives placed their company logo sticker in the same place that our analysis had positioned them, providing a 100% confirmation of our coding results. This confirmed two things: (1) it showed the validity of the results of the coding and, more importantly, (2) it demonstrated that the identified workplace designs and their explanations were adequate and suited to characterize the *current ECS use* in our sample companies in a way that can be understood by both academics and practitioners. The following section provides details of the process of analyzing the case studies.

Data analysis – Phase 1: Coding. We performed a structural coding [19] on the 13 cases using a specialized coding scheme for the analysis of ECS projects. The ECS coding scheme contained key characteristics of ECS implementation projects such as industry sector, type of ECS, use cases, collaboration scenarios, software functionality, aims/vision/objectives of the project, expected benefits, accompanying introduction measures, top management support, benefits measurement, project management, competing collaboration software and form of technical operation. Qualitative data analysis software (Atlas.ti) was used for the coding and the process was undertaken by two independent researchers. The cross-comparison of the *actual forms of use* (Use Cases) showed that although the 13 companies had been using exactly the same integrated ECS, there are notable differences in the actual use of the system, that is, they were adopting different workplace designs.

Data analysis – Phase 2: Identification of workplace designs. The coding process to identify Use Cases in the 13 organizations resulted in a list of 28 codes (right column Figure 1). Through a further process of sorting and grouping, we identified a set of ***Basic Use Cases*** that can be found in most of the companies in our sample and are part of almost all of the six workplace designs. These Basic Use Cases build on the core functionality that collaboration software offers (e.g. microblogs, blogs, wikis, forums, tasks, file exchange). Basic Use Cases comprise core collaboration activities such as the internal communication among employees or the publishing of information by the Internal Communication Department as well as the general sharing and exchange of information and files. In this group, we also find basic groupwork support such as the organization of teams and workshops and the collection and discussion of ideas. Two groups of ***Specific Use Cases*** were also identified: ***people-focused*** and ***process-focused*** workplace activities. We identified three different workplace designs in each of these two groups. These were assigned to three different levels: basic, extended and advanced. We provide a more detailed description of the two groups and the three levels in the following sections.



	Use Cases	Doc	Port	NeP	Proj	Proc	MIP
Basic Use Cases	Internal Employee Communication	X	X	X		X	X
	Knowledge Management	X	X	X		X	X
	Project Organization	X	X	X	X		
	Event Management	X	X	X	X		
	Internal Corporate Communications		X	X			X
	Idea and Innovation Management		X	X			X
	Team Organization	X		X		X	
	Software Development			X		X	X
	Workshop Organization			X		X	
People-focused Use Cases	Document Storage	X					
	(Social) Intranet	X					
	Ad hoc Teamwork	X					
	Discussions	X					
	Information Exchange	X	X				
	Central Information Storage	X	X				
	Lessons Learned	X	X				
	Functional Area Organization		X				
	Global Information Exchange			X			
Process-focused Use Cases	Audit Planning				X		
	Continuous Improvement Process				X		
	Process Optimization				X	X	X
	Quality Manual				X		
	Cross-site Collaboration				X		
	Store Management					X	
	Human Resource Management					X	
	Workshop Organization					X	
	Integrated Information Management						X
	Integration of other Business Software						X

Designs:
Doc: Information Exchange & Sharing Documents
Port: Portal Solution
NeP: The Networked Enterprise Platform
Proj: Project Support
Proc: Efficiency Tool for Business Processes
MIP: Multi-Function Integration Platform

Figure 1: Designs for the Digital Workplace (DWP) and characteristic Use Cases

4.1.1. Designs for the Digital Workplace

The six digital workplace designs were identified by examining the actual ECS use and "Use Cases" [28] that are supported by the ECS in the respective organization. The right column of Figure 1 shows the 28 Use Cases that we identified from our sample of ECS using organizations.

The findings revealed that the ***actual use*** of the integrated ECS and thus, the emerging design is dependent on the situation that led to the implementation project. The organizations in our sample all had different historical paths with differing pain points, technology situation (e.g. existing collaboration software) and company culture (e.g. a general openness or skepticism towards sharing ideas and knowledge). The reasons for introducing an integrated ECS were very different and thus, the aims and objectives were also different.

Figure 1 shows the six designs that were assigned to two groups (people/process) on three levels. The three designs on the left of Figure 1 are ***people-focused*** supporting mostly "Information and Knowledge Management" and have an emphasis on "Content and Communication". The second group in the middle of Figure 1 are ***process-focused*** leaning more towards "Business Process Support" and emphasize "Processes and Coordination". The designs in both groups are assigned to ***three levels***. On the bottom level we find designs that are characterized by a *basic use* of the collaboration system. On this level we find companies that are using the ECS for its most basic functionality represented in the Basic Use Cases. Designs on the middle level show an extended use of the platform, which is characterized by a higher degree of integration of information (people-focused) and the use for operational business processes (process-focused). The workplace designs on the top level are characterized by an advanced use of the ECS and represent the paradigms of "networking" (people-focused) and "integration" (process-focused). The people-focused design represents the paradigm of the Networked Enterprise. The process-focused design is a Multi-Function Integration Platform that provides additional functionality and data through integration with other business systems.

Whilst it can be argued that the designs show an increasing "maturity" from the bottom to the top they are not maturity stages in the strict sense of maturity as they do not represent a sequential development and the final stage is not necessarily the one that is most desirable for a user organization. The top level is not "more mature" or "better" than the bottom level. The different designs represent different forms of use of enterprise collaboration systems, which might be purposefully put in place and thus represent the final situation that a company aimed to achieve. However, our evaluation process also revealed that some companies in our sample see their current design as an "interim stage" and are still aiming to achieve a design on a higher level of the diagram.

The two designs on the bottom level have a focus on functionality. The more people-focused design is concerned with *information exchange and sharing documents*, the more process-focused design is concerned with *project support,* which primarily includes activities in the area of project management and organization. The middle level has a focus on business improvement. With the people-focused design, the *Portal Solution* aims to integrate company information. These platforms are often replacements of old Intranets that were perceived as insufficient and thus "outdated". In some cases, the new platforms are called "Social Intranet" because their defining characteristic is that they allow the employees to not only (passively) receive information but to (actively) add content and thus become authors in the Intranet. With the process-focused design some user companies have turned their ECS into an *efficiency tool to support operational business processes*. These companies are using the ECS to support internal and external business activities such as the management of physical stores or the regular exchange of information with partners or customers. The designs on the highest level of our diagram show the realization of the paradigms of "networking" and "integration". They are the closest approximation to the sales promise of the software vendors (such as IBM or Microsoft) to establish "The Enterprise 2.0" [16] or a "Social Business" [35]. The design of *The Networked Enterprise* describes a company, in which (globally distributed) employees come together, share information, connect, follow each other and thus overcome the limitations of time and space. In the case of the *Multi-Function Integration Platform*, the ECS is put in the role of an integration tool that allows employees access to functionality and information embedded in other business software (e.g. the ERP System).

4.1.2. People-focused: Information and Knowledge Management

The group of people-focused designs focuses on the interactions between people in activities to create and exchange information, working together, discussion, and basic forms of event and project management.

Information Exchange & Sharing Documents (Doc). This design describes a situation, in which employees use the ECS mostly as an exchange platform for the information that they need to do their jobs. Typical use cases for this

design are inter-employee communication (e.g. in discussion forums) and the sharing of files – activities that some companies described as "Knowledge Management".

Portal Solution (Port). The Portal Solution represents a situation, in which the ECS is mostly used as a central access point for information on specific topics of interest for employees. It is the "gateway" to internal information provided by the internal communications department as well as by fellow employees. In this group, we typically find ECS platforms that were introduced to replace outdated Intranet solutions by a more participatory "Social Intranet".

The Networked Enterprise Platform (NeP). The Networked Enterprise Platform is the design closest to the original vision of IBM at the time of launch of their product IBM Connections [35]. It describes a situation in which employees in a (frequently) globally distributed (large) organization have access to information-rich social profiles, actively follow each other and the software is bridging groups, departments and even countries thus making work in this organization a truly global experience with exchange of information and ideas.

4.1.3. Process-focused: Business Process Support

The group of process-focused designs focus on joint work to support business processes and projects.

Project Support (Proj). This design describes a situation, where the main use of the ECS is for project management. This design is focused on classical group work e.g. project planning, ideation, meetings and tasks assignment. The platform is used for the coordination of information, people and tasks.

Efficiency Tool for Business Processes (Proc). This design describes a situation, in which the organization is using the ECS for selected, very specific, ongoing business processes. Typical use cases for this design are HR management, event management, store management, workshop organization, exchange of information/files with external partners.

Multi-Function Integration Platform (MIP). The Multi-Function Integration Platform integrates data and functionality from different business software systems and provides uniform access to different functional areas of the company. Like the Portal Solution, it serves as a central entry point but in this case, it goes beyond mere access to information also providing specific functionality for workflows or business processes (e.g. working time recording or approval of orders in the procurement system). The activity stream (as an awareness feature) is an important element of the Multi-Function Integration Platform as it shows events from the integrated software systems (e.g. a request to approve an order). Typical use cases for this design are the general exchange of information and ideas, access to information that is spread over multiple information systems and, most importantly, the integration of other applications (e.g. the HR module and the sales database of the ERP System).

5. Conclusions and future work

In this paper, our aim is to investigate designs for the digital workplace. We began with an analysis of current definitions of the DWP and identified that an integrated technology platform is a core element of DWP definitions. We then presented a study of 13 ECS using organizations to identify emerging DWP designs. The analysis of the research data (collected from interviews, questionnaires and workshops) revealed six designs of ECS use. Three of them focus on people and the support of information and knowledge management and three are primarily concerned with the support of specific business processes. It is important to note that the six designs are not mutually exclusive and that their characteristics overlap in practice; one organization is likely to assign their ECS to more than one design, consequently some of the workshop participants assigned two of their company logo stickers to the poster. The designs provide a useful lens for examining the aims and objectives of an ECS introduction project and for identifying contextual differences between organizations. The designs have been through a process of review and evaluation with the participating organizations. Each of the organizations was clearly able to identify the current state of their ECS project and assign their organizations to one (or more) of these designs.

The research study presented in this paper reveals that the digital workplace is being interpreted and shaped differently by different organizations to meet their specific organizational requirements. These differences can be traced back to the specific context of the business (industry sector), historical path (e.g. motivation/pain points for starting the project, previously used collaboration software) and, interestingly, the nature of the implementation project (resources dedicated to the introduction). The next phase of work is to examine these differences and the factors that led to them in more depth to understand the transformative characteristics of ECS. This work is currently underway

and investigates the processes of digital transformation with the aim to identify the capabilities and resources organizations require for the design of their digital workplace.

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